INTEGRATED SYSTEM FOR PROTECTION OF BIRDS

REPORT

Monitoring of geese in the territory of Integrated System for Protection of Birds, Winter 2020-2021

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Contents

1. INTRODUCTION

The present study was commissioned by AES Geo Energy Ltd., Kaliakra Wind Power, EVN Kavarna, Degrets OOD, Disib OOD, Windex OOD, Long Man Invest OOD, Long Man Energy OOD, Zevs Bonus OOD, Vertikal-Petkov & Sie SD, Wind Park Kavarna East EOOD, Wind Park Kavarna West EOOD, and Millennium Group OOD in order to collect and summarize the information about the performance of the Integrated System for Protection of Birds (ISPB) that includes 114 wind turbines, 95 of which are within the Kaliakra SPA BG0002051 and 19 are in the areas adjacent to the protected zone. Considering the potentially adverse effects on environmental features, notably birds (T-PVS/Inf (2013) 15 https://tethys.pnnl.gov/publications/wind-farms-and-birds-updated-analysis-effects-wind-farms-birds-and-best-practice), the ISPB was implemented in 2018. The ISPB aims to provide a systematic monitoring programme, primarily including fatalities through collision with rotating turbine blades, disturbance leading to the displacement of birds from feeding, drinking, roosting or breeding sites (effectively a form of habitat loss), and turbines presenting a barrier to flight movements, thereby preventing access to areas via those movements or increasing energy expenditure to fly around the turbine locations (Hötker et al. 2006, Madders & Whitfield 2006, Drewitt & Langston 2008, Masden et al. 2009, 2010, de Lucas et al. 2004, 2008, Ferrer et al. 2012, Grünkorn et al. 2016).

Enacting the ISPB includes a combination of radar observations and meteorological data, integrated with field visual observations, which jointly used are essential for the accurate risk assessment and ensures that appropriate action is taken immediately. So far as potential adverse impacts of turbine collisions on birds, a Turbine Shutdown System (facilitated by an Early Warning System: EWS) is deployed.

The monitoring studies are based on the requirements of basic normative and methodological documents as follows: Environmental Protection Act, Biological Diversity Act, Bulgarian Red Data Book, Directive 92/43/EEC for habitats and species, and Directive 2009/147/EC on the conservation of wild birds, Protected Areas Act and Order RD-94 of 15.02.2018 of the Minister of Environment and Waters. Best international practices are also incorporated (https://www.seo.org/wp-content/uploads/2014/10/Guidelines_for_Assessing_the_Impact_of_Wind_Farms_on_Birds_and_Bats.pdf). Detailed information about the scope, technical rules and monitoring procedure are publicly available at a dedicated website https://kaliakrabirdmonitoring.eu/. A detailed review of the scientific information published in scientific journals and in technical reports was also carried out for the studied area.

This report presents results of the ornithological survey and monitoring at the ISPB (Figure 1) in the period 01 December 2020 to 28 February 2021, including carcass searches and Turbine Shutdown System application. The primary objective of the 2020-2021 wintering bird studies within the ISPB territory was to investigate the possible effects of the wind farms (114 wind turbines) on geese populations, notably the Red-breasted Goose (RBG) (*Branta ruficollis)* due to its conservation status (https://www.iucnredlist.org/species/22679954/59955354).

To date, there have been no indications that wind turbines in Kalaikra region has had any adverse impact on wintering geese, including RBG (http://www.acta-zoologica-

bulgarica.eu/downloads/acta-zoologica-bulgarica/2017/69-2-215-228.pdf). This report presents the latest results, from the 2020-2021 winter monitoring in the ISPB territory within Kalikra.

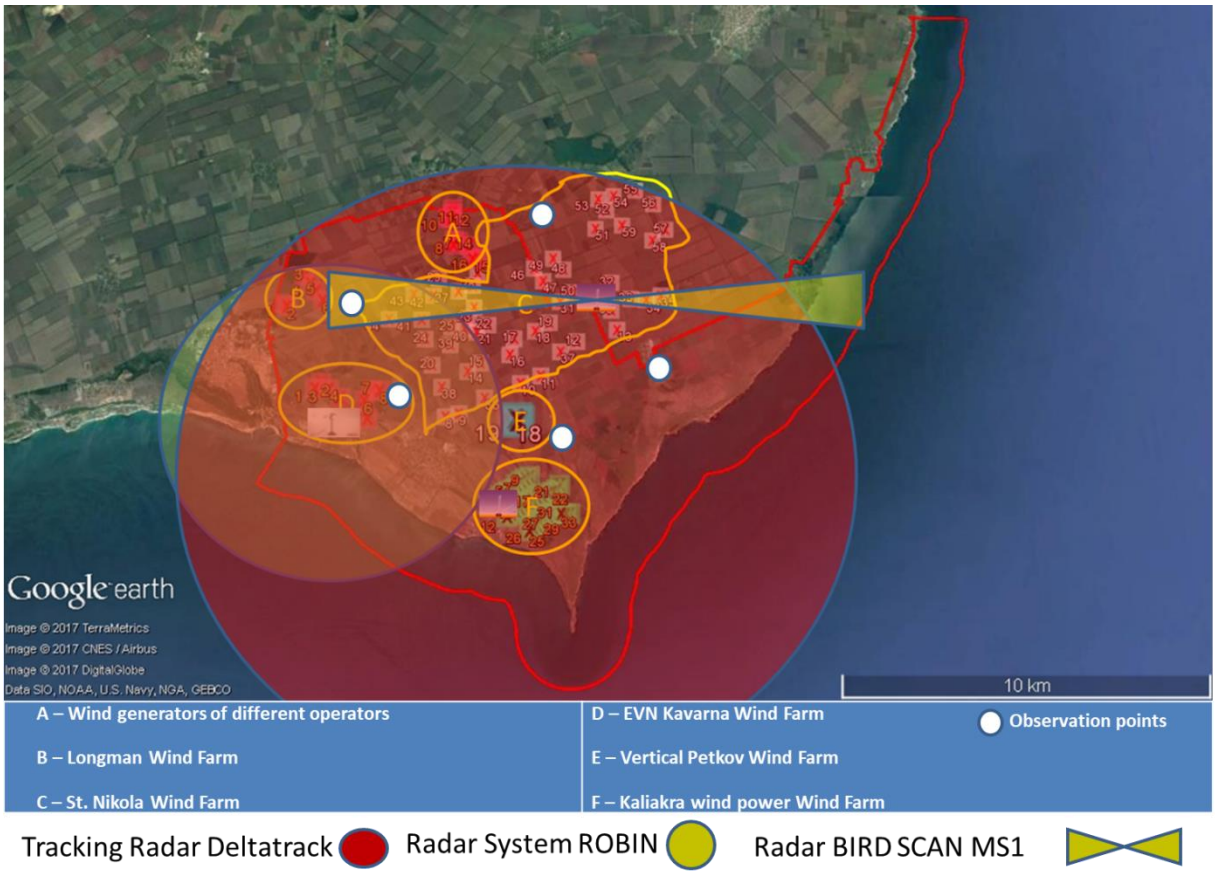

Figure 1. *A satellite photo with the location of the wind turbines covered by the ISPB and the boundaries of Kaliakra SPA.*

The geese species observed in the territory and behavioral characteristics of the geese are described in detail in previous reports available at the web site of ISPB (https://kaliakrabirdmonitoring.eu/)

2. DURATION, METHODS AND EQUIPMENT

The study was carried out between 01 December 2020 and 28 February 2021, covering a total of 90 days, which involved the period of the most intensive movements of wintering geese in the region of northern Bulgarian Black Sea coast (Dereliev et al. 2000).

The counts of the geese were performed in early mornings at take-offs from the roosting sites. The teams were also separated in couples on predetermined counting points at the plots including the ISPB territory and surrounding fields (Figure 1).

The daily routines and all methodological details are described in previous reports available at the web site of ISPB (https://kaliakrabirdmonitoring.eu/).

Ornithologists who carried out the survey

- **Prof. Dr. Pavel Zehtindjiev - Senior Field Ornithologist**

Over 25 years of research in ornithology. Over 85 scientific publications in international ornithological journals. Member of European Ornithologists Union and number of conservation organisations. Winner of the Revolutionary Discovery Award for the Ornithology of the American Ornithological Society in 2016 – The Cooper Ornithological Society.
10 years of experience in impact monitoring of wind turbines on breeding, migrating and wintering bird species in the region of Kaliakra. Former longtime member of BSPB.

- **Dr. Victor Vasilev - Field ornithologist**

Senior researcher in the Faculty of Biology, University of Shumen.
Member of BSPB and participant in number of conservation projects in Bulgaria.
Author of over 20 scientific publications in international journals. Member of BSPB.

- **Ivaylo Antonov Raykov - Field ornithologist**

Museum of Natural History, Varna
Member of BSPB. Autor of over 20 scientific publications in international journals.
5 years of experience in impact monitoring in the region of Kaliakra. Member of BSPB.

- **Kiril Ivanov Bedev - Field ornithologist**

Researcher in Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences.
Active member of conservation organization Green Balkans. Long term study on migrating birds and biodiversity of Burgas lakes. Author of three articles in Bulgarian Red Data Book. Expertise in biotechnology, conservation biology and environmental monitoring. Over 7 years of experience in impact monitoring of wind parks in Bulgaria. Member of Balkani NGO for conservation of birds and nature.

- **Yanko Yankov - Field ornithologist**

Student in Biology, University of Shumen. 7 years of experience in impact monitoring of birds in Wind Park projects in NE Bulgaria. Member of BSPB.

- **Boyan Michev – Field ornithologist**

PhD Student in Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences, Department of Ecosystem Research, Environmental Risk Assessment and Conservation Biology.
Expert in radar ornithology and analysis of the radar data for bird monitoring. Member of the European Network for Weather radar application in ornithology.

- **Minko Madjarov – Field ornithologist**

Participant in the projects Safe grounds for Red-reasted geese LIFE 09/NAT/BG/000230 and Conservation of Lesser white fronted geese LIFE 10 NAT/GR/000638. Over 15 years' experience in bird whatching. Profetional ornithologists. BirdLife member since 2004.

- **Zeliazko Dimitrov – Qualified searcher for collision victim monitoring**
- **Vasil Dimitrov – Qualified searcher for collision victim monitoring**

Types of data collected

During the survey in winter 2020-2021 the same standard data were recorded in order to be comparable with previous winter monitoring studies' results. All details concerning the data collected as well as the utililized protocols for collision monitoring and visual observations are given in previously published reports lodged at the ISPB web site (https://kaliakrabirdmonitoring.eu/).

3. RESULTS

The 90 days of the study encompassed the whole period when geese were recorded in the region during 2020-2021.

Total number of observed goose species and their numbers

In total very low numbers of geese of all observed species were present in the ISPB territory during the winter 2020-2021. Unusually low numbers of wintering geese were also observed in Bulgaria and Romania in general in the winter season 2020-2021 (https://greenbalkans.org/bg/Topla_zima_v_Dobrudzha-p7754, http://bspb.org/en/news/18000-chervenogushi-gaski-sa-prebroeni-na-vtoroto-koordinirano-prebroiavane.html).

Less than 2000 individual geese were observed during the surveys (Table 1).

Table 1. *The number of observed geese by dates of different species (data from visual observations). The dates with zero observed birds are not included.Species involve Greater White-fronted Goose (GWFG: Anser albifrons), Greylag Goose (A.anser) and RBG (Branta ruficollis).*

Date	A. albifrons	A. anser	Anser/Branta	Total
21.12.2020	110			110
02.01.2021	80			80
28.01.2021	668	24	975	1667
13.02.2021	42			42
Grand Total	**900**	**24**	**975**	**1899**

The first GWFG were recorded by observers in the territory at the end of December. The last GWFG were observed on 13 February respectively. No flock consisting only of RBG was registered. All observed RBG where in mixed flocks with GWFG and observed at a long distance at dusk when precise identification of single individuals in such flocks was not possible.

The four days with observed geese in ISPB territory are presented in Table 1. The maximum number of geese in flocks was observed on 28 January. There was only one day with geese observed in February. No RBG were observed in February.

The reason for the relatively low number of wintering geese in Bulgaria in general was likely due to the exceptionally mild winter of 2020-2021. Detailed analyses of correlation between ambient temperature and number of geese in Saint Nikola Wind Farm (SNWF) territory in the last 10 years, and discussion of the role of temperature, are presented in a previous report for part of the same territory (http://www.aesgeoenergy.com/site/images/Winter%20Report%202016-2017.pdf).

The four winters (2017-2018, 2018-2019, 2019-2020 and 2020-2021) were very mild with day temperatures reaching over 10^0 C even in January. The milder winter conditions and the lack of snow, which allowed good grazing for the birds further north-east in Ukraine and Russia, resulted in a very late arrival of RBG in their wintering grounds along the western Black Sea coast and very low numbers compared to previous seasons.

The day by day tracking via satellite transmiters of 16 tagged RBG available at the internet site of Life for safe flights "conservation of Red-breasted Goose along the global Flyway"project LIFE 16/NAT/BG000847 resulted in clear evidence for winter distribution of wintering RBG along Danube river and in the Danube delta in the winter 2020-2021 (https://savebranta.org/en/transmiters).

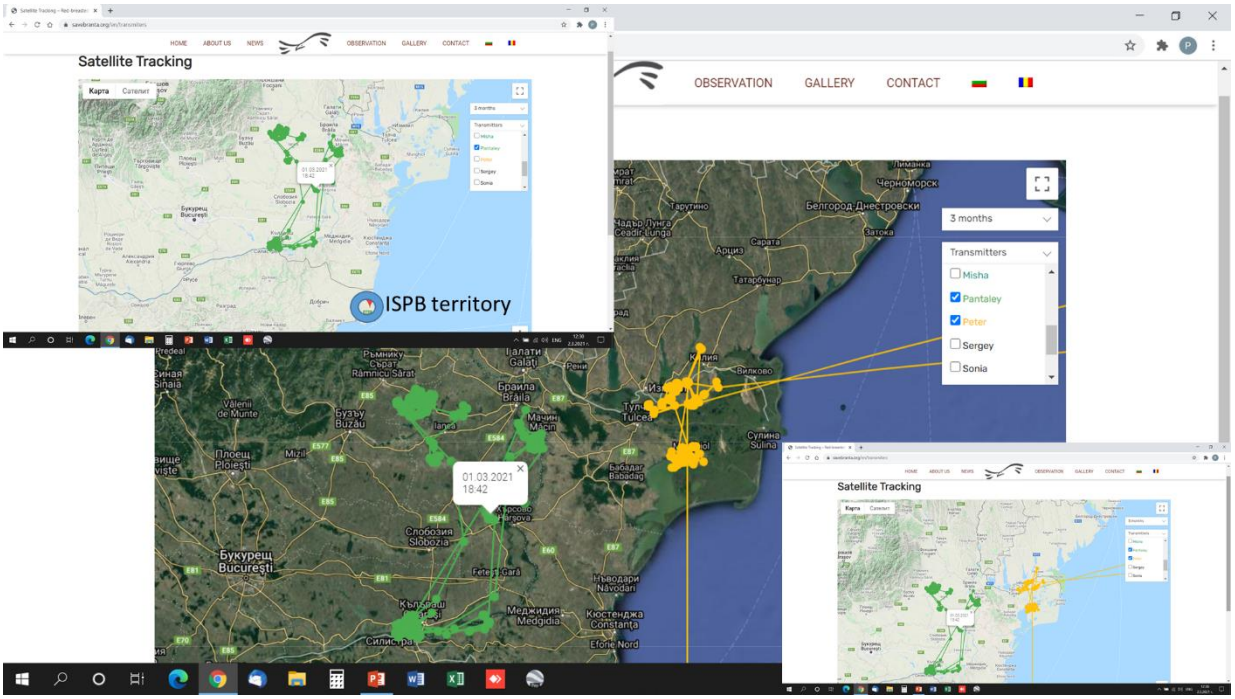

Figure 2. *According to the Life program project site only two out of over 16 fited with transmiters individuals survided and wintered in Danube delta in Winter 2020-2021. (*https://savebranta.org/en/transmiters*)*

Recent research cited in previous reports has shown that both GWFG and RBG are not 'traditional' in their choice of wintering areas but react to annual variations and changing conditions within a wintering season on food availability, driven largely by weather (and hence climatic trends over the longer-term). The underlying strategy of the geese appears to be to winter as far north (and as close to the breeding grounds) as possible. In milder winters or mild periods within a winter, geese are recorded further north: in colder winters or cold periods within a winter they are forced further south. The ISPB territory is in the south of the putative wintering possibilities, and to the south of roost/freshwater drinking locations (Durankulak and Shabla lakes) used as focal sites when geese use the wider Dobroudzha region. As well as a reduction in geese being recorded at ISPB territory (and SNWF) recent mild winters have been accompanied by many observations across the European continent suggesting a recent increase in the focal species using wintering areas further north, most likely as a result of global climatic warming. This shift of wintering ranges has been observed in various bird taxa (Estrada et al., 2016).

Spatial distribution of feeding geese in the ISPB territory

The flocks of geese tracked and confirmed visually are presented in maps below. Due to the low number of wintering geese in this winter spatial analysis was not possible. In general, (the same as in previous winters) concentration of flights in NE part of the ISPB territory was observed in winter 2020-2021. More detailed analysis of the feeding preferences of wintering geese in ISPB territory are presented in previous reports available at the web site of ISPB (https://kaliakrabirdmonitoring.eu/).

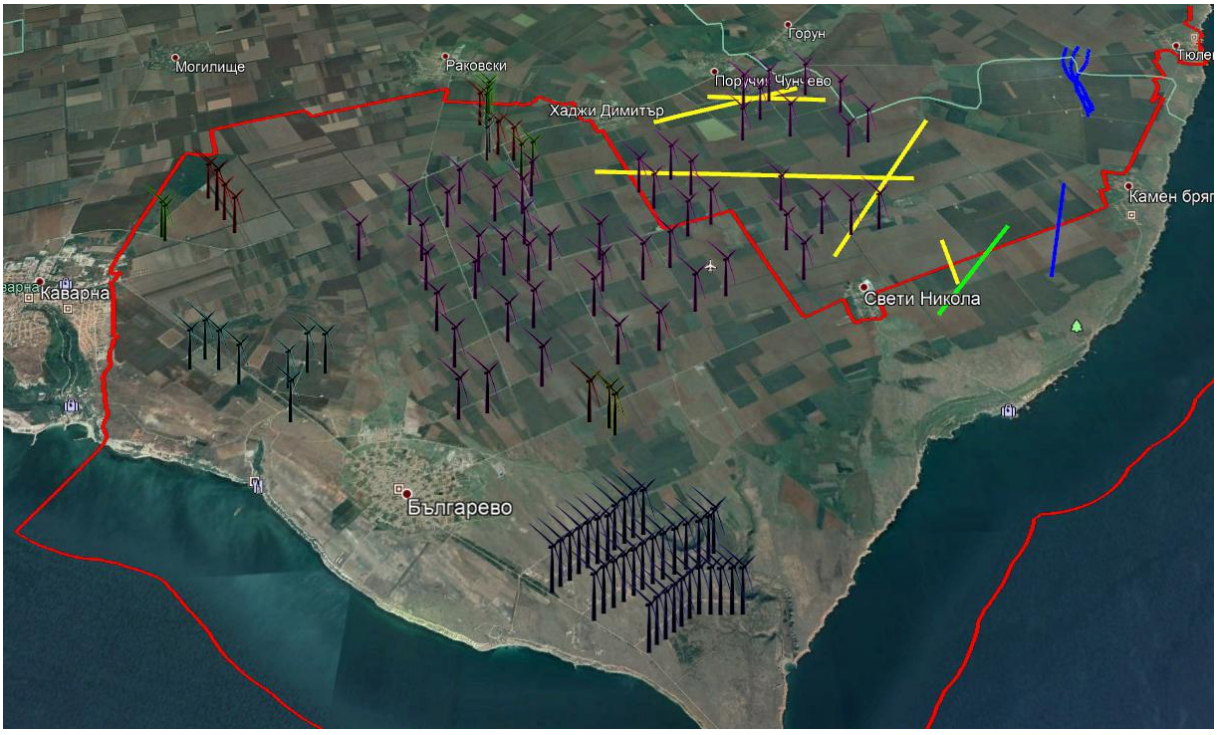

Figure 3. *Flocks of of GWFG (yellow), Greylag goose (green) and mixed flocks of GWFG and RBG (blue) (yellow)observed during the monitoring period in winter 2020-2021 in ISPB territory.*

Carcass monitoring results

All 114 turbines were programmed to be searched every seventh day in the periods of autumn and spring migration as well as during the wintering period of geese. The rest of the time during the whole year every turbine was searched once per month if the areas under turbines were accessible. During the winter monitoring (subject of this report) all 114 turbines were searched for carcasses during the whole winter survey period (01 December 2020 –28 February 2021) when more birds were at risk of collision. The frequencies of searches are presented in Table 2.

The mild weather in the 20020-21 winter did not limit the programmed searches in the study period due to snow cover (as noted in some previous reports regarding SNWF). In a limited number of days with strong rain, however, the plots of 200 x 200 metres under turbines were searched from the turbine base (stairs and platform around 3 metres high) by binoculars. The large size with substantial white plumage of any geese carcases renders them clearly visible, especially in the predominant agricultural habitat at this time of year (largely bare soil): the elevated observation points using binoculars at turbine base stairs/platform will have increased their potential detection. On the other hand, with a rain-saturated soil the programme was aware that walked transects in these muddy conditions could affect the local farmers' plans for the

following growing and harvesting season. Nevertheless, over 95 % of the programmed searches under the 7 day-interval protocol using walked transects in the 200 x 200 metres plots were completed.

Searcher efficiency and carcass persistence has been examined twice during winter monitoring at the part of the ISPB territory – in February 2010 and in January 2016 (see SNWF monitoring reports). The results were similar and broadly confirm the efficiency in searches and carcass removal rates under turbines for a programme of searches every seven days.

Table 2. *Number of searches per turbine during the winter monitoring 2020-2021*

Turbine code	December	January	February	Total
ABBalgarevo	2	4	4	10
АВГ1	2	4	4	10
АВГ2	2	4	4	10
АВГ3	2	4	4	10
АВГ4	2	4	4	10
ABMillenium group	2	4	4	10
ABMillenium group Mikon	2	4	4	10
AE10	2	4	4	10
AE11	2	4	4	10
AE12	2	5	4	11
AE13	2	5	4	11
AE14	2	3	4	9
AE15	2	5	4	11
AE16	2	4	4	10
AE17	2	4	4	10
AE18	2	5	4	11
AE19	2	5	4	11
AE20	2	4	4	10
AE21	2	4	4	10
AE22	2	4	4	10
AE23	2	4	4	10
AE24	2	4	4	10
AE25	2	4	4	10
AE26	2	4	4	10
AE27	2	4	4	10
AE28	2	4	4	10
AE29	2	4	4	10
AE31	2	5	4	11
AE32	2	5	4	11
AE33	2	5	4	11
AE34	2	5	4	11
AE35	2	5	4	11
AE36	2	4	4	10
AE37	2	5	4	11

Turbine code	December	January	February	Total
AE38	2	4	4	10
AE39	2	4	4	10
AE40	2	4	4	10
AE41	2	4	4	10
AE42	2	4	4	10
AE43	2	4	4	10
AE44	2	4	4	10
AE45	2	4	4	10
AE46	2	5	4	11
AE47	2	5	4	11
AE48	2	5	4	11
AE49	2	5	4	11
AE50	2	5	4	11
AE51	3	4	4	11
AE52	3	4	4	11
AE53	3	4	4	11
AE54	3	4	4	11
AE55	3	4	4	11
AE56	3	4	4	11
AE57	3	4	4	11
AE58	3	4	4	11
AE59	3	4	4	11
AE60	2	5	4	11
AE8	2	4	4	10
AE9	2	4	4	10
ДВГ1	2	4	4	10
ДВГ1HSW250	2	4	4	10
ДВГ2	2	4	4	10
ДВГ2MN600	2	4	4	10
ДВГ3	2	4	4	10
ДВГ4	2	4	4	10
ДВГ5	2	4	4	10
DC1	2	4	4	10
DC2	2	4	4	10
E00	2	4	4	10

Turbine code	December	January	February	Total
E01	2	4	4	10
E02	2	4	4	10
E04	2	4	4	10
E05	2	4	4	10
E07	2	4	4	10
E08	2	4	4	10
E09	2	4	4	10
M1	2	4	4	10
M10	2	4	4	10
M11	2	4	4	10
M12	2	5	4	11
M13	2	5	4	11
M14	2	5	4	11
M15	2	5	4	11
M16	2	5	4	11
M17	2	5	4	11
M18	2	5	4	11
M19	2	5	4	11
M2	2	4	4	10
M20	3	4	4	11
M21	3	4	4	11
M22	3	4	4	11
M23	3	4	4	11

Turbine code	December	January	February	Total
M24	3	4	4	11
M25	3	4	4	11
M26	3	4	4	11
M27	3	4	4	11
M28	3	4	4	11
M29	3	4	4	11
M3	2	4	4	10
M30	3	4	4	11
M31	3	4	4	11
M32	3	4	4	11
M33	3	4	4	11
M34	3	4	4	11
M35	3	4	4	11
M4	2	4	4	10
M5	2	4	4	10
M6	2	4	4	10
M7	2	4	4	10
M8	2	4	4	10
M9	2	4	4	10
VP1	2	4	4	10
VP2	2	4	4	10
ABZevs	2	4	4	10
Grand Total	**253**	**480**	**456**	**1189**

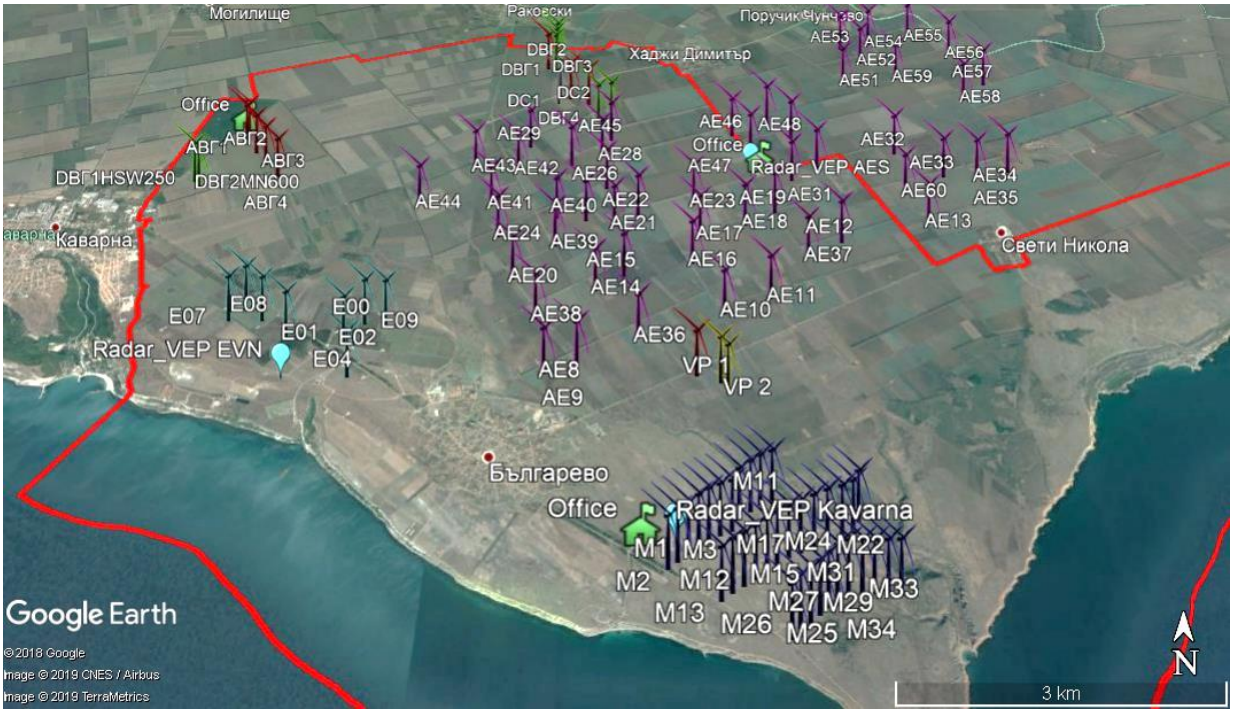

Figure 4. *Locations of turbines searched for collision victims according to codes for turbines given in Table 2.*

Systematic searches under 114 turbines covered by ISPB (Table 2) in the period 01 December 2020 – 28 February 2021 resulted in four intact carcases which can be associated with collision with wind turbines. Details of the collision victims recorded in the ISPB during winter 2020-2021 are presented in Table 3.

Table 3. *Collision victims in ISPB in winter 2020-2021.*

Date	Latin name	Red Data book	IUCN
04.02.2021	*Pluvialis apricaria*	Not Listed	Least Consern
11.02.2021	*Asio flammeus*	Not Listed	Least Consern
20.02.2021	*Anthus campestris*	Not Listed	Least Consern
22.02.2021	*Turdus pilaris*	Not Listed	Least Consern

No body parts or intact remains of geese which could be considered as collision victims were detected after an accumulation of 1189 searches under 114 turbines in the period 01 December 2020 – 28 February 2021. Therefore, no evidence for collision of any goose species, including RBG, has been found in the winter 2020 – 2021 when geese were present, and turbines were operating.

There were circumstances in the 2020-2021 winter which required the Turbine Shutdown System (TSS). The number of TSS instances applied during this period are presented in Table 4.

Table 4. *Number of Turbine Shutdown System applications in winter 2020-2021.*

Date	Wind farm	Species	Number	Time stop	Time start
31.01.2021	Wind Farm St. Nikola	*Pelicanus crispus*	3	12:04	12:28
08.02.2021	Wind Farm St. Nikola	*Haliaeetus albicilla*	1	11:48	12:15

4. CONCLUSIONS

The relatively mild 2020-2021 winter is probably the main reason for low number of observed geese of two species in ISPB territory.

Daily observations from December 2020 to February 2021 (inclusive) revealed that the recorded presence of geese in ISPB territory was compressed into a short time period within the winter, which was essentially the same as already established in 2018 and 2019 winter monitoring of the same territory as well as studies 2008 – 2018 in a part of the ISPB territory (SNWF).

The number of wintering geese observed in ISPB during winter broadly corresponds to the total number of wintering geese in the larger region of coastal Dobroudzha region; but is lower, because of relatively distant roosting sites to ISPB territory of wintering geese at the two fresh water lakes used for roosting – Durankulak and Shabla.

114 wind turbines covered by ISPB were not a source of collision mortality for wintering geese, even though they fly through or feed within ISPB territory. The evidence for this is that no remains of geese that could be attributed to collision with turbines were found during systematic searches under operational turbines not only in the 2020-2021 winter but also in any of the 10

winters when all 114 turbines or 52 turbines at SNWF (part of ISPB) has been operational and searched systematically every winter season.

No displacement (disturbance) reaction from geese has been observed for the period 2008-2021 as a result of construction and operation of wind turbines in the ISPB territory. Observed numbers of geese of all species as well as observed spatial distribution of flying and feeding geese does not indicate gross displacement from the operational turbines or its immediate environs.

From research associated directly with ISPB described in the present and previuse reports (and see previous SNWF winter reports on the AES Geo Energy website, and earlier surveys from this part of the same territory) the study area continues to be a feeding ground for RBG as well as GWFG, but it also remains an unimportant area for both species, as indicated in pre-construction studies. Consequently, and based on other studies, the investigated 114 wind turbines present no material threat through preventing use of food supplies: especially in light of other agricultural practices such as crop type and field size of the preferred crop of feeding geese.

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